

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on October 3, 2005, and the references cited therewith.

'103 Rejection of the Claims

Claims 1-15 were rejected under 35 USC Section 103(a) as being unpatentable over Weiss et al (WO 00/04055) in view of Loda (US 4,163,172), Mukohyama et al (US 4,886,840) and Botman et al (Nuclear Instruments and Methods in Physics Research B 139).

Claim 1 is the only currently pending independent claim, and recites that the polymerizable composition is irradiated at a pulse rate greater than or equal to about 500 pulses per second. Applicants have discovered that the manner in which the dose is delivered can have dramatic effects on the polymerization process itself. Specifically, when the dose per pulse is relatively low (e.g. about 10 to 90 Gy) and the pulse rate is below 500 Hz, the reaction takes place primarily in the homogenous mode because of the longer time intervals between pulses (diffusion). As the frequency of the pulses is increased above about 500 Hz, the heterogeneous mode of polymerization becomes more dominant, because the shorter interval between pulses increasingly favors heterogeneous kinetics (see pp. 13-14 of the specification). This surprising and unexpected discovery is not appreciated or otherwise made obvious anywhere in the art of record.

Applicants first note that none of the references cited by the Examiner describe providing a pulse rate this high. The Examiner has asserted that since total dose is a function of pulse frequency, dose per pulse and residence time, it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. Thus, the optimum values for dose per pulse and pulses per second could be achieved by routine experimentation. However, nothing in the cited references would indicate that the devices for generating e-beams described therein should even have been capable of providing pulse frequencies greater than or equal to 500 Hz. For example, the upper range limit described in Botman is 50 Hz, far below the 500 Hz recited in the present claims. Applicants believe a pulse rate of just 10 percent the claimed minimum is obvious in view of the teachings of Botman. The prior art references utterly fail to teach or suggest the benefit of a relatively low dose per pulse and a high pulse rate. Using

the prior art teachings, one would merely seek to adjust total dose, without appreciating the benefits of the use of low doses at high frequencies. This failure of the prior art to teach or suggest the claimed invention necessitates a finding of non-obviousness of the claimed invention. The Examiner appears to assert that it is possible, using Mukohyama, to derive the teaching of pulses in the range of 500 to 3,000 Hz, but Applicants are unable to identify such teaching in Mukohyama, and ask that the Examiner provide further guidance for how such results can be derived from Mukohyama.

In contrast to the prior art methods of producing heterogeneous polymerization, the present invention includes a method of producing heterogeneous polymerization by having a low dose/pulse and a high pulse rate. The Examiner refers to Applicants' disclosure at page 2, lines 3-7 for the proposition that heterogeneous e-beam polymerization produces highly gelled polymers of adequate chain lengths between crosslinks. However, the Examiner overlooks the further assertion at page 2, lines 7-10 that three known methods of achieving heterogeneous polymerization include emulsion, solid phase catalysis, and precipitating conditions, and that all three of these methods involve phase separation to maintain the heterogeneous conditions. This is a totally new, highly efficient and unexpected way to achieve the advantage of heterogeneous polymerization in a single phase system. There is no precedence for this in the prior art, and therefore, the claimed invention is patentable over the cited references.

The Examiner also asserts at page 3 of the office action that "e-beam polymerization of Weiss et al is inherently a heterogeneous single phase e-beam polymerization". Applicants respectfully disagree. Although Weiss teaches a polymerization method for forming a pressure-sensitive adhesive, the present invention further improves upon Weiss by teaching the specific polymerization method comprising providing a substrate; coating at least a portion of said substrate with a polymerizable composition; providing an electron beam that is capable of producing pulses of accelerated electrons; *and irradiating said polymerizable composition with said pulses of accelerated electrons thereby heterogeneously polymerizing said polymerizable composition in a single phase, said pulses of accelerated electrons having a dose per pulse of about 10 to about 90 Gy, wherein said composition is irradiated with said pulses of accelerated electrons at a pulse rate equal to or greater than about 500 pulses per second.* Even if Weiss is asserted to teach heterogeneous polymerization, nothing in Weiss teaches pulses of accelerated

electrons having a dose per pulse of about 10 to about 90 Gy, wherein said composition is irradiated with said pulses of accelerated electrons at a pulse rate equal to or greater than about 500 pulses per second.

Conclusion

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612-746-4783) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 50-3688

Respectfully submitted,

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Date January 3, 2006

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 3rd day of January, 2006.

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